

OPTIONAL TRAINING CURRICULUM

Use of an Automated Blood Glucose Analysis Device

KY Ambulance Service Specific Continuing Education Curriculum for the Emergency Medical Technician Basic (EMT-B) in Blood Glucose Analysis

Instructions Preparatory to Meeting the EMT-B Scope of Practice
Requirements

INSTRUCTOR MANUAL

Kentucky Board of Emergency Medical Services
Pursuant to 202 KAR 7:060 and 7:080

This curriculum relates to the Department of Transportation (D.O.T.) 1994 EMT Basic National Standard Curriculum from the Module 4 Diabetes/Altered Mental Status component, and is designed as a KY optional Supplemental curriculum referenced in 202 KAR 7:060 and 7:080.

INTRODUCTION

This is a minimum of thirty (30) minutes training in addition to the Medical Emergencies (diabetic) section of the Emergency Medical Technician Basic (EMT-B) student initial training. This curriculum is for use in an EMT Basic (EMT-B) continuing education course and is designed to instruct students in obtaining a blood specimen for blood glucose testing and monitoring. Performance of the skills will be ambulance service specific and the training is primarily designed for EMT-B's to assist an ALS provider in patient care.

This curriculum is an optional, KY training Module commencing with the effective date of 202 KAR 7:060 and 7:080. An EMT-B working for an ambulance service contracted with a physician medical director and offering this procedure in patient care shall be required to obtain this training through continuing education. This curriculum, or an equivalent curriculum, that has been submitted to, reviewed and recommended to the Kentucky Board of Emergency Medical Services for approval, is to be used. Training through continuing education is for a person who received their initial EMT-B training prior to the introduction of this curriculum as acceptable training and procedure for use within the KY EMT-B scope of practice.

OBJECTIVES:

Psychomotor

1. The student shall appropriately obtain a blood specimen for testing purposes.
2. The student shall obtain a blood glucose level reading.
3. The student shall appropriately dispose of all sharps while adhering to Body Substance Isolation (BSI) procedures.
4. The student shall be able to correctly troubleshoot and correct simple problems.
5. The student shall be able to follow manufacturer and later developed service specific preventive maintenance procedures related to the monitoring device.

WORK ENVIRONMENT:

With ambulance service having written agreement with a physician Medical Director.

**LEAD INSTRUCTOR
QUALIFICATIONS:**

Minimum, KY EMT-B Instructor. If this person does not additionally have ALS credentials, an adjunct faculty holding current ALS credentials may need to be recruited to teach this lesson based on this curriculum.

**RECOMMENDED MINIMUM
TIME TO COMPLETE:**

Thirty (30) minutes, which includes part Lecture and part Skills practice time.

EQUIPMENT:

Blood glucose monitoring unit (glucometer)
Alcohol pad
Dry sterile dressing
bandage (Band-Aid)
universal precautions
lancet (or other piercing device)
test strips

OVERVIEW:

- I. Describe the basic concept of glucose monitoring.
 - A. Patient assessment
 1. Patient exhibits altered level of consciousness of suspected diabetic/hypoglycemic origin or unknown cause.
 - a. disorientation to time, location, events, or people or
 - b. responsive to persistent verbal or painful stimuli with inappropriate words/sounds or
 - c. unresponsive (coma) or
 - d. seizures/tremors.
 - e. rule out possibility of head trauma or cerebrovascular accident
 - B. The goal of obtaining a specimen is to get an accurate blood glucose concentration.
 - C. The blood concentration is read in milligrams of glucose per deciliter (mg/dL) of whole blood.
- II. Obtaining a specimen.
 - A. Assemble needed equipment
 1. blood glucose monitoring unit
 2. alcohol prep
 3. dry sterile dressing
 4. bandage
 5. lancet (or other piercing device)
 6. test strip
 7. universal precautions
 - B. Turn on machine and perform any initial start up or calibration procedures as directed by the manufacturer (especially if after cleaning the meter, if the meter has been dropped, or if the results do not reflect how the patient feels or when results are suspected to be inaccurate). For example:
 1. Check Strip Tests
 2. High/Low Calibration Tests
 - C. If available, wash the patient's hands with soap and water and dry thoroughly. Warm water stimulates the blood flow to the fingers making it easier to obtain a sample.
 - D. Select and prepare the site. The distal tip of any finger may be used. However, the preferable ones are the second (next to the forefinger) and third (next to the "pinky") fingers. **NOTE***: Scar tissue may be present if the patient continually pricks the same finger for personal monitoring. Also, someone who has very calloused finger tips may present difficulty in

obtaining a good blood sample. If unsuccessful on first try, it may be best not to waste time on attempting to get a sample, but **concentrate on other interventions and transporting the patient to the hospital! “TREAT THE PATIENT, NOT THE DEVICE”!**

1. Have the patient hang their arm down to the side for 10 - 15 seconds before the stick.
 2. If using alcohol prep, make sure fingertip is allowed to dry completely before performing the fingerstick.
- E. Hold the lancet or other needle device firmly on the side (“off-center” in the fleshier part, not the bony side) of the patient’s fingertip. The greater the pressure of the needle device against the finger, the deeper the puncture.
1. If the needle device has a trigger mechanism - press release.
 2. If using a “lancet” type needle only, hold the device close to the fingertip area and quickly jab into the finger.
 3. Gently squeeze the finger to obtain a large, hanging drop of blood.
- Note* A more accurate sample is usually obtained if the first drop is wiped away with a clean 2X2 gauze square or similar dry wipe, and use the second drop of blood for analysis.**
- F. Apply the drop of blood from the patient’s finger directly to the Test Spot of the Test Strip, or pick up the drop of blood with a capillary tube. Always use a new Test Strip for each blood specimen - never reuse a Test Strip.
1. If the capillary tube is open at both ends
 - a. first slide a bulb over one end
 - b. hold the capillary tube horizontally and touch the open end to the drop of blood
 - c. the blood will flow into the tube by capillary action
 - d. with the end of the tube containing the blood positioned over the Test Spot, squeeze the bulb gently to expel a shiny drop of blood with no air bubbles
 2. If the capillary tube is plastic and closed at one end
 - a. squeeze the tube or bulb, and hold the tube horizontally while touching the open end to the drop of blood
 - b. gently release pressure on the tube or bulb to draw up the blood
 - c. with the end of the tube containing the blood positioned over the Test Spot, squeeze the bulb gently to expel a round shiny drop of blood with no air bubbles.
- Dispose of the sharp in an appropriate container.
- H. Apply the sterile dressing to the tip of the finger. Once bleeding has stopped, apply a bandage (Band-Aid) to the tip of the finger.
- I. The glucometer will then display the glucose concentration. Follow manufacturer’s guidelines for test results.

III. Trouble shooting

- A. Most often, each manufacturer will list in the operator's book, a key to error messages that the machine may display. Follow the manufacturer's guidelines to correct.
- B. Some common errors:
 - 1. insufficient blood specimen to cover Test Spot
 - a. perform stick from beginning again with a new Test Strip
 - 2. using Test Strips not coded for that particular machine
 - a. follow manufacturer's guidelines for changing code in machine, then perform stick from beginning with new Test
 - 3. Test Strip is not inserted correctly
 - a. perform stick from beginning again with a new Test Strip
 - 4. expired or otherwise defective Test Strips (it is not recommended to use a bottle of Test Strips that was opened for the first time more than 4 months)
 - a. Obtain new bottle of Test Strips
 - 5. air bubbles in the specimen on the Test Spot
 - a. perform stick from beginning again with a new Test Strip
 - 6. the Test Strip moved out of the correct position during the test
 - a. remove Test Strip and perform stick from beginning again with new Test Strip
 - 7. the glucometer is set in the neonatal mode with non-neonatal blood being tested and vice versa
 - a. reset the glucometer to match the blood sample

IV. General Precautions and Limitations

- A. Do NOT use plasma or serum samples as results will be inaccurate. If using venous blood collected in a tube, make sure that the red cells are thoroughly mixed and adequately reoxygenated prior to testing. Plasma/serum results are 10% higher than corresponding whole blood tests. Do NOT use specimens collected using fluoride as a preservative (gray topped tubes).
- B. Venous blood samples must be adequately oxygenated (pO₂ greater than 45 mm Hg) to ensure accurate results.
- C. Shock administration of vasoactive agents, and other factors that decrease peripheral circulation may cause capillary blood glucose results to differ from venous or arterial results. Therefore, venous or arterial samples may be preferred.

- D. Non-neonatal samples with hematocrits below 25% or above 60% may result in inaccurate blood glucose readings.
- E. Store Test Strips in a cool, dry place below 86°F (30°C). Use caution when interpreting neonatal blood glucose results less than 50 mg/dL. Results may be inaccurate if neonatal sample hematocrits are less than 25% or more than 76%. All neonates exhibiting hypoglycemic symptoms should have their glucose concentrations confirmed by lab methods regardless of monitor results.
- F. If patient's symptoms are inconsistent with monitoring results and procedural errors are ruled out, follow your protocol for treating the symptoms. Blood glucose concentrations measure with a glucometer may be significantly lower than the true level if significant water loss and dehydration has occurred. This results because severe dehydration can cause increased blood viscosity and interfere with the penetration of the sample into the Test Spot and lead to inaccurately low results. Because severe dehydration is also associated with development of the hyperglycemic-hyperosmolar state (with or without ketosis), a potentially life threatening acute complication of diabetes, factors which cause it must be considered. For example:
 - 1. sustained uncontrolled diabetes
 - 2. vomiting or diarrhea
 - 3. prescription drugs such as diuretics
 - 4. shock (severe hypotension)

V. Normal lab values:

- A. Adult 70 - 110 mg/dL
- B. Neonatal 30 - 60 mg/dL (****All neonates exhibiting hypoglycemic symptoms, regardless of blood glucose screen results, should have glucose levels confirmed by a laboratory test.*)

SKILL SEQUENCE:

- 1. Patient assessment
- 2. Assemble equipment
- 3. Prepare glucometer
- 4. Select and prepare site
- 5. Perform fingerstick (**EMT-B should have BSI precautions in place prior to actually sticking finger)
- 6. Place adequate drop of blood on Test Strip
- 7. Obtain blood glucose concentration measurement
- 8. Dispose of sharps
- 9. Place dressing and bandage ("BandAid") on fingerstick site